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COMMITTEE ON THE PEACEFUL
USES OF OUTER SPACE
Scientific and Technical Subcommittee
Thirty-fourth session
Vienna, 17-28 February 1997

DRAFT REPORT OF THE SCIENTIFIC AND TECHNICAL SUBCOMMITTEE ON THE WORK OF ITS THIRTY-FOURTH SESSION

VI. QUESTIONS RELATING TO SPACE TRANSPORTATION SYSTEMS AND THEIR IMPLICATIONS FOR FUTURE ACTIVITIES IN SPACE

1. In accordance with General Assembly resolution 51/123, the Subcommittee continued its consideration of the item relating to space transportation systems.

2. In the course of the discussion, delegations reviewed national and international cooperative programmes in space transportation systems, including expendable launchers, reusable space shuttles and space stations. In particular, the Committee noted that China was continuing the use and development of its Long March series of launch vehicles; that India was continuing development of the Geostationary Satellite Launch Vehicle and had succeeded in the developmental launchings of the Polar Satellite Launch Vehicle; that Japan had started to upgrade its H-II launch vehicle, had successfully launched the J-I and M-V launch vehicles and was continuing its development of the H-IIA launch vehicle; that the Russian Federation had launched space objects of various types using expendable launchers of the Soyuz, Cosmos, Proton and other series and had sent a number of national and international crews to the Mir space station; that Ukraine, in cooperation with the Russian Federation, was continuing to produce and successfully use the Tsyklon and Zenit rocket launchers, as well as offering them for use in international cooperative activities; that Spain was developing the indigenous launcher Capricornio, that the United Kingdom was cooperating with ESA in its Future European Space Transportation Investigation Programme (FESTIP); that the United States was continuing its programme of expendable launches and flights of the reusable Space Shuttle, many of the flights involving significant international participation, particularly during the link-ups of the Space Shuttle Atlantis with the Mir station; that Canada, Japan, the Russian Federation and the United States, together with ESA, were continuing preparations for the International Space Station programme; and that ESA was continuing its development of the Ariane series of launch vehicles.

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3. The Subcommittee took note of developments in the United States commercial launch industry, including the Atlas, Delta and Pegasus expendable vehicles and the Reusable Launch Vehicle (RLV) three-pronged programme that included the X-33 sub-orbital vehicle. In that connection, the Subcommittee noted that the X-33 test vehicle was the most advanced part of the RLV programme, aimed at developing the kinds of technologies required by industry to build a new launch vehicle that would provide affordable and reliable access to space. The Subcommittee took note of the Automatic Landing Flight Experiment (ALFLEX) and study of the HOPE-X experimental unmanned winged vehicle of Japan.

4. The Subcommittee took note of developments in the Russian Federation, including the improved Proton-M launcher, the ecologically clean Rus and Angara launchers. The Subcommittee also took note of the introduction into the space transportation system of the Russian Federation of the Start-1, Start and Rokot launchers that were based on converted ballistic missiles. The Subcommittee further noted that progress was being made in the plans for the construction of a new cosmodrome called Svobodny in the eastern part of the Russian Federation were progressing, as well as in the plans for the modernization of the Baikonur cosmodrome in Kazakstan in connection with its increased use for commercial launchings by international enterprises.

5. The Subcommittee stressed the importance of international cooperation in space transportation in order to provide all countries with access to the benefits of space science and technology.

6. The Subcommittee recommended that consideration of the item be continued at its next session.

VII. EXAMINATION OF THE PHYSICAL NATURE AND TECHNICAL ATTRIBUTES OF THE GEOSTATIONARY ORBIT; EXAMINATION OF ITS UTILIZATION AND APPLICATIONS, INCLUDING, *INTER ALIA*, IN THE FIELD OF SPACE COMMUNICATIONS, AS WELL AS OTHER QUESTIONS RELATING TO SPACE COMMUNICATIONS DEVELOPMENTS, TAKING PARTICULAR ACCOUNT OF THE NEEDS AND INTERESTS OF DEVELOPING COUNTRIES

7. In accordance with General Assembly resolution 51/123, the Subcommittee continued its consideration of the item relating to the geostationary orbit and space communications.

8. In the course of the discussion, delegations reviewed national and international cooperative programmes in satellite communications, including progress in communications satellite technology that would make satellite communications more accessible and less expensive and would increase the communications capacity of the geostationary orbit and the electromagnetic spectrum.

9. The Subcommittee took note of the growing use of communications satellite systems for telecommunications, television broadcasting, data networks, environmental data relay, mobile communications, disaster warning and relief, telemedicine and other communications functions.

10. Some delegations expressed the view that the geostationary orbit was a limited natural resource and that saturation should be avoided in order to ensure that all countries had non-discriminatory access to the orbit. Those delegations felt that a special *sui generis* legal regime was required to ensure equitable access by all States, particularly developing countries. They felt that the role of the International Telecommunication Union

(ITU), which concerned the technical aspects, and of the Committee on the Peaceful Uses of Outer Space with respect to the geostationary orbit were complementary. Other delegations expressed the view that questions relating to the geostationary orbit were being addressed effectively by ITU. Some delegations expressed the view that, in considering the question of equitable access, account should be taken in particular of the geographic situation of the equatorial countries.

11. The view was expressed that on the basis of considerations in the Scientific and Technical Subcommittee, the Legal Subcommittee could draft an appeal to the World Radiocommunication Conference to be held later in 1997 with the aim of stressing the principle of guaranteeing equitable access to the geostationary orbit, as well as a possible solution to the congestion of the geostationary orbit by "paper" satellites, and that that appeal could be regarded as a finalization of deliberations on the matter in the Legal Subcommittee.

12. Some delegations noted that the use of the geostationary orbit, like other orbits, was affected by the problem of space debris and that efforts were needed to minimize the generation of debris in the orbit and to move satellites shortly before the end of their useful lives into disposal orbits beyond the geostationary orbit.

13. The Scientific and Technical Subcommittee recommended that consideration of the item relating to the geostationary orbit and space communications be continued at its next session.

VIII. PROGRESS IN NATIONAL AND INTERNATIONAL SPACE ACTIVITIES RELATED TO THE EARTH ENVIRONMENT, IN PARTICULAR PROGRESS IN THE INTERNATIONAL GEOSPHERE-BIOSPHERE (GLOBAL CHANGE) PROGRAMME

14. In accordance with General Assembly resolution 51/123, the Subcommittee continued its consideration of the item concerning progress in national and international space activities related to the Earth environment, in particular progress in the International Geosphere-Biosphere (Global Change) Programme.

15. The Subcommittee noted the progress being made through international cooperation in the International Geosphere-Biosphere (Global Change) Programme, with the participation of many countries. It also noted that such a joint international effort was of fundamental importance for examining the future habitability of the planet and for managing the common natural resources of Earth. The Subcommittee took particular note of the need to involve as many countries as possible in the scientific activities of the Programme, both in developed and in developing countries.

16. The Subcommittee noted that a special two-day symposium, entitled "Transformation and Analysis of Space Obtained Geophysical Data for Global Change Studies", would be organized during the Thirty-Second Scientific Assembly of COSPAR, to be held at Nagoya, Japan, in 1998. The aim of that symposium would be to assist developing countries in realizing the new possibilities for global change studies that were currently available through the use of satellite remote sensing data.

17. The Subcommittee took note of the important contributions of satellite remote sensing to environmental monitoring, to planning sustainable development, to water-resource development, to monitoring crop conditions and to predicting and assessing drought. The Subcommittee noted that the Center for Climatic Studies and Forecasting of Brazil was fully operational and that its weather and climate reports were available free of charge.

18. The Subcommittee noted the important contribution of meteorological and atmospheric research satellites to studying global climate change, the greenhouse effect, the degradation of the ozone layer and other oceanic and global environmental processes. The previously launched Topex/Poseidon oceanographic satellite, the National Oceanic and Atmospheric Administration (NOAA) series, the geostationary operational environmental satellite (GOES) series, Total Ozone Mapping System, RADARSAT, Earth Resources Satellite (ERS) 1 and 2, the Japanese Earth Resources Satellite (JERS-1), the Indian Research Satellite series, the Sich 1 satellite and the recently launched ADEOS 1 satellite, were important tools for that purpose, as would be the planned Phase II Mission to Planet Earth enterprise under the new NASA Millennium Programme, the Jason 1 Programme, TRMM, Envisat, Meteor, Meteosat, NOAA-K, GOES-K and other similar spacecraft. The Subcommittee noted the need for further space research relating to climate change, energy exchange between the atmosphere and land and ocean surfaces, weather patterns, vegetation distribution and other environmental factors.

19. The Subcommittee noted with satisfaction that during the symposium organized by COSPAR and IAF and held during its current session, several presentations were devoted to the collection, processing and archiving of data within the framework of the Mission to Planet Earth and the International Geosphere-Biosphere (Global Change) Programme, as described in section XI of the present report.

20. The Subcommittee noted the importance of international cooperation in the various existing and planned satellite systems for environmental monitoring. It recommended that other States should consider participating in such cooperative activities.

21. The Subcommittee recommended that consideration of the item be continued at its next session.

IX. MATTERS RELATING TO LIFE SCIENCES, INCLUDING SPACE MEDICINE

22. In accordance with General Assembly resolution 51/123, the Subcommittee continued its consideration of the item relating to life sciences.

23. The Subcommittee recalled that the General Assembly, in its resolution 51/123, had considered it particularly important that all countries should have the opportunity to use the techniques resulting from medical studies in space.

24. The Subcommittee noted that studies of human and animal physiology under the microgravity conditions of space flight had led to important advances in medical knowledge in such areas as blood circulation, hypertension, osteoporosis, cardiovascular physiology, sensory perception, immunology and the effects of cosmic radiation. It noted that important new information in those fields had been obtained through experiments on the Mir space station, particularly during the flights of ESA, French, German and United States astronauts aboard that space station. Important data were gathered during several United States Space Shuttle missions, including flights involving Canadian and French astronauts. Important data were also gathered from biological experiments on the BION 11 satellite, launched by the Russian Federation with the participation of experts from France, Ukraine and the United States and from experiments on sounding rockets such as TEXUS.

25. The Subcommittee took note of a bilateral German-Russian cooperation project entitled MIR '97, which would take advantage of this long-duration manned mission for experiments focusing on human physiology, materials sciences and technology. It also noted the French-German cooperation in the development of a diagnostic facility for cardiovascular research in space, CARDIOLAB, to be used on the International Space Station, and the development by the space agencies of Bulgaria, Germany and the Russian Federation of a new generation of medical

measuring equipment, the Bulgarian Neurolab-B and the automatic bio-technological system SVET, as well as the Hungarian thermoluminescent dosimeter (Pille).

26. The Subcommittee noted that applications of space technologies were demonstrating growing promise in medicine and public health on Earth as reported by France and the Russian Federation. In that connection, the Subcommittee noted that specialists from Argentina, Brazil, Chile, Costa Rica, Uruguay and the United States were preparing a biotechnology experiment consisting of growing two types of proteins under microgravity conditions. The proteins could be used to develop new drugs for the control of infectious diseases such as Chagas' disease. The Subcommittee also noted that products of space biotechnology, such as pharmaceutical and medical instruments, could contribute to improved health care. The Subcommittee noted the importance of space technology for those purposes and encouraged further research and exchange of information on those applications.

27. The Subcommittee noted that space studies in life sciences and medicine had important potential benefits for all countries and that efforts should be made to promote international cooperation to enable all countries to benefit from those advances. The Subcommittee heard a special presentation by the delegation of Chile on the research on developing medicaments for Chagas' disease through protein crystallization in microgravity conditions, as mentioned in paragraph __ above.

28. The Subcommittee recommended that consideration of the item be continued at its next session.

X. MATTERS RELATING TO PLANETARY EXPLORATION AND MATTERS RELATING TO ASTRONOMY

29. In accordance with General Assembly resolution 51/123, the Subcommittee continued its consideration of the item on planetary exploration and the item on astronomy.

30. The Subcommittee noted that several planetary exploration missions were currently under way. The Galileo spacecraft had successfully manoeuvred into orbit around Jupiter and started a complex investigation of its natural satellite system; the Ulysses spacecraft had continued its investigations of the solar polar regions during its extended mission. The Subcommittee noted the launchings by the United States of the Mars Global Surveyor and Pathfinder for global observation of Mars and the Near-Earth Asteroid Rendezvous (NEAR) mission for the study and observation of asteroids. It also noted missions planned for future launch, including the Lunar Prospector for lunar exploration; Cassini/Huygens, for investigation of Saturn and its moons; and the Stardust and Rosetta missions to asteroids and comets. The Subcommittee noted the high degree of international cooperation in all of those investigations and stressed the need to further enhance international cooperation in planetary exploration to enable all countries to benefit from and participate in those activities.

31. The Subcommittee noted that a research team of NASA and other scientists had found evidence that primitive forms of microscopic life might have existed on Mars 3 billion years ago. The research was based on sophisticated examination of an ancient Martian meteorite (ALH84001) that had landed on Earth some 13,000 years ago. The Subcommittee also noted that NASA was investigating the feasibility of bringing scientifically significant samples from Mars.

32. The Subcommittee noted that the use of spacecraft for making astronomical observations from above the atmosphere had greatly advanced knowledge of the universe by allowing observations in all regions of the electromagnetic spectrum. It noted that with the upgraded and repaired Hubble Space Telescope, Rosat, Compton Gamma Ray Observatory, Extreme Ultraviolet Explorer, Astro-D, Freja, Koronas I, Polar and Wind satellites, the

SAX astronomy satellite, the Magion 4 and 5 sub-satellites, and the Orfeus 2 ultraviolet spectrometer, and with data from the recent ASTRO-SPAS sub-satellites, Interball, Infrared Space Observatory, Solar and Heliospheric Observatory and the radioastronomy satellite Haruka, as well as the Spartan series of sub-satellites, astronomers had powerful tools for their investigations of the universe. The planned launches of the Radioastron satellite, Spektr-Roentgen-Gamma observatory, Advanced X-ray Astrophysics Facility, Space Infrared Telescope Facility, Spektr-UV, International Gamma Ray Astronomy Laboratory (INTEGRAL), Very Long Base Interferometry Space Observatory, X-ray Multi-Mirror Mission (XMM), Gamma 1 and 400, Ikon, Relikt 3 and many others would open up further realms of the universe to detailed observation. The Subcommittee noted with satisfaction that all of those projects were open to broad international cooperation.

33. The Subcommittee took note of the resolution adopted by the COSPAR Council at its thirty-first session in July 1996, in which the Council stated that it was vitally important to preserve an adequate spectrum range for astronomical radio science and atmospheric environmental science and its application. The Subcommittee heard presentations by IAU on adverse environmental impacts on astronomy and by the delegation of Japan on planetary exploration, as described in paragraph __ of the present report.

34. The Subcommittee recommended that consideration of the items be continued at its next session.

XI. THE THEME FIXED FOR SPECIAL ATTENTION AT THE 1997 SESSION: SPACE SYSTEMS FOR DIRECT BROADCASTING AND GLOBAL INFORMATION SYSTEMS FOR SPACE RESEARCH

35. In accordance with General Assembly resolution 51/123, the Subcommittee paid special attention to the theme "Space systems for direct broadcasting and global information systems for space research". The Subcommittee noted with satisfaction that, at its invitation, COSPAR and IAF had organized on 17 and 18 February 1997 a symposium on the theme, as described in paragraphs __ and __ of the present report.

36. The Subcommittee also heard special presentations on the special theme by the delegation of Spain and by ESA, as described in paragraph __ of the present report.

37. The Subcommittee took note of the fact that space systems for direct broadcasting had already matured and developed into a valuable tool for global education and information exchange. They were capable of providing multimedia services such as integrated video, voice and computer applications including Internet connectivity. Such systems significantly contributed to the globalization of the world economy and to deregulation and competition in the field of commercial communications. At the same time, the Subcommittee noted that there were still large areas in the world lacking basic communications services. The Subcommittee further noted the importance of satellite radio and digital audio broadcasting systems, which could provide inexpensive means of communication and education to remote areas.

38. The Subcommittee noted the role of developing countries in the Global Change Programme. It also noted that the establishment of a global information system for space research was important to promoting their participation. While developing countries were experiencing significant environmental change as a result of the demands from a growing population and extensive economic development strategies, they were increasingly becoming aware of the serious environmental problems they were facing. The Subcommittee also noted that space systems were essential to the collection and distribution of all kinds of research data and that future global information systems should also include national airborne systems and a national ground observation network. Regarding data processing and archiving, the Subcommittee noted that to fully exploit the potential of already

acquired and future research data, more international cooperation was needed for their proper archiving, to ensure global free access to databases, to develop mechanisms for improving access to meta-data, and to agree on formats and software packages for data conversion that were necessary for scientific research.

39. The Subcommittee also took note of information on the Spanish national geostationary communications system, HISPASAT, and the new policy of Brazil regarding the definition of direct broadcasting and direct-to-home systems dealt with within the frequency coordination efforts of ITU.

40. On the basis of the results of its deliberations on this special theme, the Subcommittee recommended that cooperation efforts should include the dissemination of information on the potential of direct broadcasting and the promotion of ways of accessing global information systems.

XII. OTHER MATTERS

A. Advisory Committee preparations for the Special Session of the Committee on the Peaceful Uses of Outer Space (UNISPACE III Conference)

[Paragraphs to be added]

B. Other reports

41. The Subcommittee welcomed the annual reports of EUMETSAT (A/AC.105/670), EUTELSAT (A/AC.105/652), INTELSAT (A/AC.105/651) and ESA (A/AC.105/653). The Subcommittee requested those organizations to continue to report on their work.

42. The Subcommittee expressed its appreciation to COSPAR for its report on the progress in space research and to IAF for its report on space technology and applications, the two reports being issued jointly under the title *Highlights in Space: Progress in Space Science, Technology and Applications, International Cooperation and Space Law, 1996* (A/AC.105/654).

43. The Subcommittee noted with appreciation the participation in its session of representatives from United Nations bodies, specialized agencies and permanent observers and found their statements and reports helpful in enabling the Subcommittee to fulfil its role as focal point for international cooperation in space.

C. Review of the future role and work of the Scientific and Technical Subcommittee

44. The Subcommittee recommended that the agenda for its thirty-fifth session should include the following priority items:

(a) Consideration of the United Nations Programme on Space Applications and the coordination of space activities within the United Nations system;

(b) Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space; and preparations for the Special Session of the Committee on the Peaceful Uses of Outer Space (UNISPACE III Conference) by the Advisory Committee;

(c) Matters relating to remote sensing of the Earth by satellites including, *inter alia*, applications for developing countries;

(d) Use of nuclear power sources in outer space;

(e) Space debris.

45. The Subcommittee recommended that the agenda for its thirty-fifth session should also include the following items:

(a) Questions relating to space transportation systems and their implications for future activities in space;

(b) Examination of the physical nature and technical attributes of the geostationary orbit and of its utilization and applications, including, *inter alia*, in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries;

(c) Matters relating to life sciences, including space medicine;

(d) Progress in national and international space activities related to the Earth's environment, in particular progress in the International Geosphere-Biosphere (Global Change) Programme;

(e) Matters relating to planetary exploration;

(f) Matters relating to astronomy;

(g) Consideration of the theme fixed for special attention at the thirty-fifth session of the Scientific and Technical Subcommittee: "___".

46. The Subcommittee recommended that, regarding agenda item (g) in paragraph ___ above, COSPAR and IAF, in liaison with Member States, should be invited to arrange a symposium, with as wide a participation as possible, to be held during the first week of the thirty-fifth session, to complement discussions by the Subcommittee on the special theme.

47. With regard to the dates for the thirty-fifth session, the Subcommittee recommended that it be scheduled from __ to __ February 1998.

D. Tribute

48. The Chairman, on behalf of the Subcommittee, expressed his condolences to the delegation of China on the passing away of that country's paramount leader, Deng Xiaoping.